

# XINJIANG'S GEMS AND JADES

## 新疆寶石和玉石

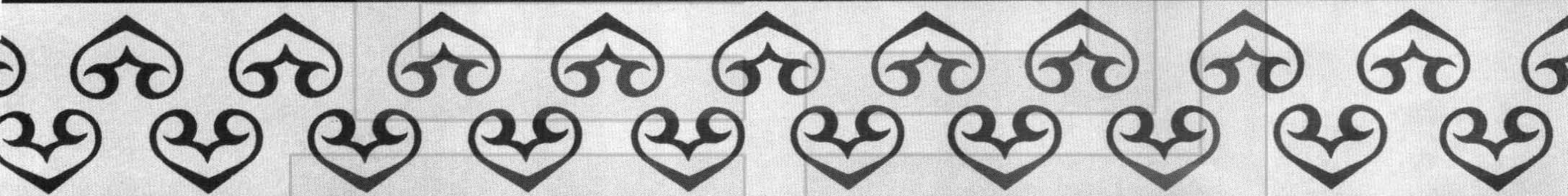


XINJIANG PEOPLE'S PUBLISHING HOUSE

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Yang Hanchen Yi Xianrui Yi Shuangting Song Jianzhong Min Yaoming



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发展宝石工艺向国际  
市场销售，争取外汇建设祖  
国新疆。祝新疆各族人民为  
四化作贡献。

王震  
五月三日

Inscription in the handwriting of Wang Zhen on 3rd June, 1982.

“Develop jade craftsmanship, sale to international market, increase foreign exchange and construct our motherland's Xinjiang.

Accept my best wishes for the contribution of four modernizations by all nationalities in Xinjiang.”

多之开采宝石·玉石，  
为祖国四化建设服  
务。  
王思枚  
1982.6.3.

Inscription in the handwriting of Wang Enmao on 3rd June, 1982.  
“Exploit gems and jades abundantly, serve to the construction of  
four modernizations of our motherland.”

يا قوتا، قانتسز و با ستمگان  
مدلسو له نامين تو پ قز سب  
له ن زاما نو با تسو روي تو  
هون تو له قوا سب ايل!

إسماعيل إيمت

82. 6. 3.

Inscription in the handwriting of Ismayil Emet on 3rd June, 1982.  
“Open up gems, jades and other mineral products abundantly,  
make contribution for the four modernizations.”



## Preface

Xinjiang is vast in territory and rich in mineral resources, and it is, starting from ancient times, the “land of treasure” of our great country – China. Xinjiang’s Hotan Jade has been utilised for thousands of years. The jades dug from Yin Dynasty ruins in Anyang of Henan, the pieces of jade of the “jade burial suit sewn with fine gold wire” that belonged to the Zhong Shan Jing Wang, Liu Sheng, and his wife unearthed in Manzheng county, Hebei province and the jade carving “Yu the Great-tamer of the floods” that weighed more than ten thousand “jin” and was treasured in the Palace Museum were all Hotan Jade.

Gems and jades are rare and precious technological material. Because of their bright colour and transparency, people feel a sense of beauty and they have a great admirative value. They are used as decorations and are looked upon as a symbol of wealth in many countries, and so have an important economic value. Many kinds of gems and jades are widely used in the most advanced branches of industry and medicine.

Since the founding of the People’s Republic of China, with the systematic development of geological work, new gems and jades have been found. Especially in recent years, our country has expanded international contact, there is an increasing demand of gems and jades because of the development of foreign trade. It creates a new geological task – to accelerate the research, the exploration and the exploitation of gems and jades.

In order to keep abreast of the new demand, the geological work of Xinjiang’s gems and jades achieved rapid development according to unified plans, and received corresponding economic benefits. After enormous work, 26 kinds of gems and 44 kinds of jades have been defined and most of them are utilised.

Xinjiang’s gems and jades are one of the region’s superior resources, and it is one of the provinces (regions) that makes good use of the exploitation of our country’s gems and jades. In order to summarize the geological work of Xinjiang’s gems and jades and the experience of their technological application, to better develop their resource superiority, to have more contribution for the development and construction of Xinjiang, the comrades of Research Centre of Experiment and Test, Xinjiang Bureau of Geology and Mineral Resources spent five years to display their fruitful results for the readers of “Xinjiang’s Gems and Jades”.

This book introduces systemically the kinds of gems and jades that are found in Xinjiang up till now, their characteristics, technological application and the geological features of origin. It discusses the characteristics of gems and jades as minerals and rocks geologically and the direction of research; the characteristics of being technological materials from the angle of technological application, their demands and the appraisal features from fakes, and brings about an integration of the combination of



these two aspects. As a result, it can be taken as a reference for those who work on geology and gems and jade technology.

Another characteristic of this book is that there are annotations for pictures, using pictures to explain the writing and it is rich both in pictures and writings. There are more than a hundred colourful photos, reflecting principally the general pictures of Xinjiang's gems and jades and their handicraft.

This book also applies a large number of experimental test data and carries out analysis and inquiries theoretically, and is a book that has a certain research value. Besides, the words are easy to understand, and explain the profound in simply terms, so it is also a meaningful reading of general science.

“Xinjiang's Gems and Jades” is a book that has an overall systematic introduction of gems and jades in a certain region, a great beginning for our country. I believe that with the coming out of this book, the geological work of Xinjiang's gems and jades and their utilization in handicraft will take on a new phase.

Hu Bing

May, 1985

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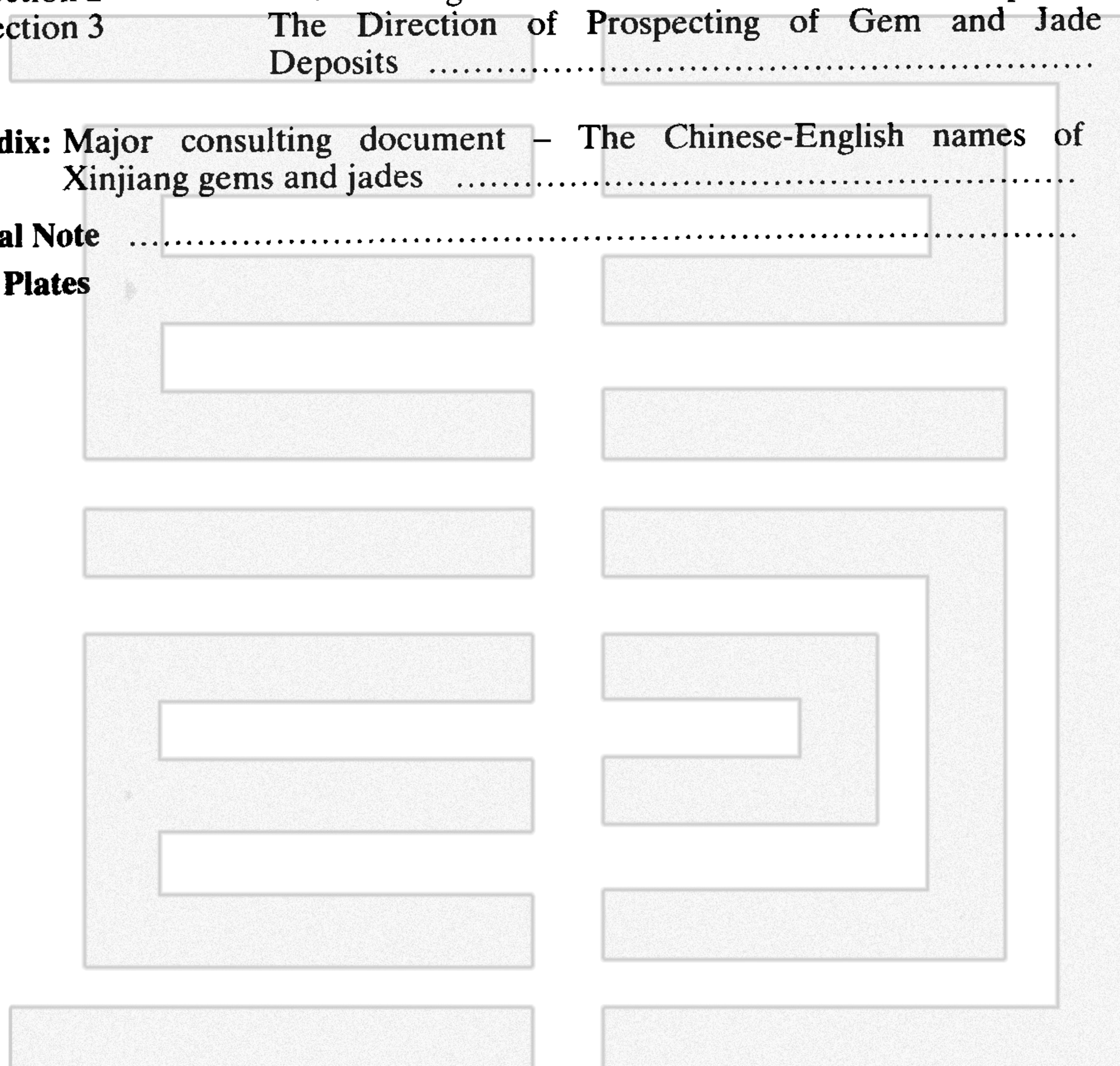
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**Colour Plates**



## Introduction

Starting from the seventies, there was “a popular demand of precious stones” in the world and the price of the gemstones rose by folds. As a result, gems and jades which are used as technological materials become valuable mineral sources for people.

According to statistics, at the end of the fifties, the annual output of the global gemstones amounted to more than US \$200 million, and at the end of the sixties more than US\$1,000 million. In the middle of the seventies, the total output of the world's gemstones materials amounted to US \$25,000 million. Many countries exported gemstone materials and gained a lot of foreign exchange. For example, the export value of Columbia's emeralds was US\$2 millions in 1973 and was increased to US\$40 million in 1974, and it reached US\$75 million in 1979. The USSR provides more than 50 kinds of gem materials and mineral treasures in the national and foreign trade market as gemstones handicraft, for more than 25 countries and areas, at the value of 15 million roubles. United States is the largest import country of gems. In 1975, they imported gems (not including diamonds) for 820 million U.S. dollars, in 1977 1638 million U.S. dollars, and in 1979 2.4 billion U.S. dollars.

Gems and gold have the same monetary function in history. In modern times, currency devaluation happens very often, but the function of gems as a currency is still stable. The U.S.S.R. list rubies, emeralds, diamonds and sapphires as the national bank's assets, and they become the state's monetary fund of gems. In the “Diamond Bursary” of The U.S.S.R., thousands of diamonds are kept, and those which are larger than 20 Karats are named. Afghanistan put all the lapis that are mined in the national treasury. There are lots of rare treasures in private hands in the world; very often they are examined by special institutes and recognised certificates are given so as to become private fixed assets. One can foretell that, with the uplifting of people's material life, more gems, jades and their handicrafts are needed in the society, especially the demand for middle to low-grade gems will increase rapidly.

Since gems and jades have such an important economic value and Xinjiang has always enjoyed the name of “the Country of Gold and Jade”, its Hotan jade and handicrafts are famous all over the world. The numerous kinds of gems and jades and their good quality have an universal appeal. As a result, the development of Xinjiang's gems and jades has a very bright future and an important economic meaning. In recent years, through enormous geological work, 10 types of 27 kinds of gems, and 16 types of 44 kinds of jades are found, most of them are used to develop for the interest of national's economy.

During the recent years, many countries reinforce the studies on gems, the characteristics of jades themselves, their technological performance and the minerogenetic law of gems and jades deposits. Gems mineralogy, the studies on gem deposits and gem technology are gradually developed into independent branch subjects.

Gems are complete mineral crystals or mineral pieces from nature, if studied mineralogically in

great detail, it is possible to get important informations for crystal chemistry and mineralogy, so as to solve the problem of the function of rocks and minerals' formation, and thus solve some important theoretical problems of geology. Through the studies on diamonds and its associated minerals, people are able to suggest different hypothesis on the earth's crust and the nature of different layers of the earth's mantle. A.E. Fersman of The U.S.S.R. obtained fruitful results through researches on the dykes of pegmatite in Mulkinsk-Arabash region where is famous for gems. When studying the Ural emeralds, Fersman brought out the theory of "De-silicon" process of rocks. We can foretell that with further studies on gem minerals, more laws on geology will be found out.

We start from the basic theories of gem mineralogy and make use of different modern tests to study the characteristics of Xinjiang's various gems, jade minerals and rocks, including the material elements, chemical features, physical property and technological characteristics, and the use and appraisal features of gems and jades.

With the development of the science of crystal growth and the studies of the industrial application of synthetic crystals, it leads to the rapid development of artificial synthetic gems. Nowadays, many important gems like diamonds, emeralds, rubies, sapphires and opals can be made artificially.

Although artificial synthetic gems and different kinds of fakes are popular and they do bring difficult problems for appraisers, modern methods are used nowadays, (such as infrared spectrum, Raman spectrum, paramagnetic resonance and magnetic nuclear resonance, etc.) and colour elements and content, optics constant and the difference of micro hardness are used as methods of appraisal. They can distinguish more accurately natural gems from fakes. Through our concrete work, we provide our readers in this book necessary data and information in this aspect.

Gemology is still at its developmental stage. It is not complete from basis theories to the method of general investigation of mineral deposits, and needs to have further conclusion so as to reinforce scientific research and upgrade its research level. Our book has worked hard in this aspect but this is just the beginning.

At the moment, there are not many books on gems and jades, some of them put the emphasis on the knowledge of technological application's introduction and some belong to general scientific readings. "Xinjiang's Gems and Jades" tries to unify the different aspects of gem and jade minerals, the studies on rocks, mineral deposits and technology, and combine them with the specific characteristics of Xinjiang, so as to have some attempts academically and specifically. In the process of writing, attention is given to the combinaton of the following aspects: geological field observations and indoor appraisal of minerals and rocks; the macroscopic appraisal of gem and jade material and the microcosmic appraisal of different test methods; the definitions of gems and jades' varieties and the experiments of technological process.

Part of the material in the book is the first-hand information gathered by the writer, and most of the appraisals of minerals and rocks are conducted by ourselves. There is the analysis information on nephrite and Kunlun jade by scanning the transmissive electron-microscope; the data of infrared inspec-trum on nephrite, tourmaline, noble triphane and amazonite, and a part on electronic probe. These materials have a fixed value on the explanation of the cause of colour of gems and jades. In order to define the new variety of gems and jades, trial polishing and carving are conducted on each one of the newly collected mineral and rock, and trial sale is conducted for some of them. If the results are satisfac-tory and the mineral has a fixed production, the new variety is thus defined.

This book is written by Yang Hanchen, Yi Xianrui, Yi Xuangting, Soung Jianzhong and Min Yaoming from the Research Centre of Experiment and Test, Xinjiang Bureau of Geology and Mineral

**Resources.** The colour photos were taken by Gao Lauging, Fan Jao Jian, Wu Chunzhang and Feng Fei. The black and white micrographs are taken by Zhu Cheng Ying and the infrared spectrum is analysed by Yu Guimei.

In the process of information-collecting, a lot of help came from Bureau of Geology and Mineral Resources of Xinjiang, the concerning basic units and other departments, and they provide a lot of valuable first-hand information for this book. In the course of writing, concrete guidance was given by senior engineers Hu Bing, and Zhang Liang Chen and help part of the information. Besides, valuable opinions were given by engineers: Yan Hongbing, Li Benghai, Zhang Yongge and Xue Xudi in the course of studies results appraisals. And the associate Professor Wang Gongque of Xinjiang's Technological Institute granted the favour of reading the manuscript, and put forward very constructive amendments. All of them own our heart-felt thanks.

The book "Xinjiang's Gems and Jades" can be described as the fruit of labour and wisdom for the geological workers of different nationalities in Xinjiang during thirty years of time. Without their endurance of the hardships of an arduous journey of fieldwork, this book cannot come out. Here, we are just trying to absorb the valuable experience from former workers and the present world of gems and jades, and do some work of sorting out the summarization according to our practice. However, because of the limited level of the writers, and the inexperience of conducting, for the first time, a comprehensive sorting out of the information of the gems and jades in a certain region, criticisms pointing the inappropriateness and errors of the book are earnestly requested.



# **Chapter One      A Brief History of the Exploitation and Utilization of Xinjiang's Gems and Jades**

Xinjiang is situated in the north-western frontier of China. It is vast in area and rich in resources. Various types of gems and jades are produced abundantly, among which Hotan Jade is famous far and wide, and it has a long history of exploitation and utilization. Here we emphasize on the brief history on the exploitation and utilization of Xinjiang's nephrite, gem, crystal and agate.

## **I. A Brief History of the Exploitation and Utilization of Xinjiang's Nephrite (Hotan Jade and Jasper Jade)**

### **The New Stone Age**

The exploitation and utilization history of Xinjiang's nephrite started before the New Stone Age. Among the unearthed artifacts from the site of historic relics of the Age in China, ornaments made of jade were found. For example, jade articles from the early period of the New Stone Age, such as jade pieces, jade villous themeda and jade bades were found in the layer of Hemudu Culture (5000-4750 B.C.) which was situated to the northwest of Hemudu Village, Yuyao County, Zhejiang Province, in 1976; during 1956-1973, dozens of various jade articles were found from the layer of Majiabing Culture (about 4750-3700 B.C.) to the layer of Liangzhu Culture (about 3300-2250 B.C.) in the Caoxie Mountain in Wu County, Jiangsu Province, of which from the layer of Liangzhu Culture were delicately made, and the Cong (a hub-shaped jade with octagon on the edge and a hole in the middle), and the Bi (a round flat jade with a hole in the middle) were identified to be of nephrite. In 1976 in Shenshan County, Shanxi Province, sickles and axes made of black jade and grey jasper were unearthed in the historical site of the Longshan Culture of Shimao. In Xinjiang, a jade axe was once found on the Luobunaoer (the Luobubo Lake) early historical site. "It was carved in nephrite jade, fine and smooth, with its size similar to the axe nowadays. Tried with the thumb, it was as sharp as a knife, and put it to the sun, it was shining." The above facts show that jade was used in our country since the New Stone Age, and most of the materials came from Xinjiang. It means that in the New Stone Age, Xinjiang started using nephrite in making tools and ornaments.



We also know, from the recorded history of our country for about four thousand years, that there were writings about Xinjiang's jades in the remote legendary period of Yellow Emperor four thousand years ago. For example, in the earliest geographical writing of our country, A Book of Mountains And Seas recorded in the Mishan Mountain there production were almost in white Jade and white jade cream and Yellow Emperor took some jade from the Mishan Mountain and buried it on the southern side of the Zhongshan Mountain. A Supplement to a History of the Yue State, by Yuan Kang of the Han Dynasty mentioned, "At the time of Yellow Emperor jade was used as weapons to cut the trees for constructing recorded buildings." The Chronicles in Bomboo Strips, "In the ninth year of the reign of Emperor Shun of the Yiouyu family, Queen Wangmu of the West came to the Court to pay nomage by presenting present the "white jade rings" and jade pieces. It shows that the history of Xinjiang's jade utilization was long-standing.

### **The Shang Dynasty**

In the Shang Dynasty, jade was widely used in making sacrificial vessels and ornaments. "The jade-product technology in the Shang Dynasty was of a high standard. The aristocrats, men and women, wore jade articles as ornaments. Jade was also used in carving various sacrificial vessels, such as 'Gui' (an elongated pointed tablet of jade held in hands by ancient rulers on ceremonial occasions), 'Zhang' (a jade tablet), 'Bi' (a round flat piece of jade with a hole in its centre, used for ceremonial purposes in ancient China), and 'Cong' (a long hollow piece of jade with octagon shape) so as to show their noble identity. There were also jade articles for admorative purposes which were carved in exquisite craftsmanship. On some bronze ware, jades were also set in part of it and became precious compound objects". (A Draft History of China, by Guo Moreo). At the Yin Dynasty Ruins in Anyang County, Henan Province, hundreds of jade articles were unearthed from the Fuhao's Tomb. The materials used were white jade, grey jasper, black jade and green jade. These jade articles were presented to the Emperor of Shang as tributes. From the jade articles in the Ruins, it is estimated that Hotan Jade had been exported in large quantity to the Central Plain Provinces of China before the late Shang Dynasty, and that was more than three thousand years ago.

For the quality and sources of the jades dug archaeologically, there was not yet any unified conclusion. There were three different views: one was that they included nephrite and jadeite. Zhang Hongzhao thought, "The jades of ancient times that were worthy of the five virtues enumerated in A Book of Characters (Shu Wen Jie Zi, by Xu Shen) were nephrite and jadeite (jade). Another view was that there was just nephrite and it originated from Xinjiang. As pointed out by Sung Yingxing of Ming Dynasty, "For the jades that came to the central part of China, the precious ones all from Yutian. According Joseph Leight of England, he said, "There were a lot of discussions about the origins of jade. After some detailed discussions, it was agreed that Xinjiang's Hotan jade, mountains and rivers around Yerqiang were the main, or perhaps the only jade - producing centres for more than two thousand years. Another view was that they included nephrite, serpentines and Nanyang jade which were similar to nephrite. As said by Xia Xiangrong, "Something should be pointed out and that was, although there were various names for ancient jades, from the unearthed jades and jade articles handed down, most of them were made of nephrite or jade materials that were similar to nephrite. As to whether jadeite was included, it is a problem to be discussed." The analysis on the unearthed jade articles shows that the jade